

Chapter 2 **Hydrologic Conditions**

Introduction

Hydrologic conditions are typically discussed using “water years,” which begin on October 1 of a calendar year and end on September 30 of the following year. The chronological period covered by this report includes parts of two water years: the last nine months of water year 2003 (January through September 2003) and the first three months of water year 2004 (October through December 2003). To concisely describe hydraulic conditions in the Bay-Delta during this period, this chapter will discuss water year 2003, which runs from October 2002 through September 2003.

Methods

Water years are classified in this report using two indices: the Sacramento Valley 40-30-30 Water Year Hydrologic Classification Index^{1,2} (Sacramento Valley Index), and the San Joaquin Valley 60-20-20 Water Year Hydrologic Classification Index^{3,4} (San Joaquin Valley Index) (SWRCB 1999). The Sacramento Valley Index is used to characterize water years statewide because most precipitation falls in the northern half of California, and much of that precipitation flows through the San Francisco Estuary (SWRCB 1999). The San Joaquin Valley Index is used predominantly for regional applications; however, this index provides supporting information concerning water conditions within the San Joaquin Valley. According to the Sacramento Valley Index⁵, water year 2003 was classified as “Above Normal,” while the San Joaquin Valley Index⁶ classified water year 2003 as “Below Normal.”

¹ The Sacramento Valley 40-30-30 Water Year Hydrologic Classification Index is equal to $0.4 \times$ current April to July unimpaired runoff + $0.3 \times$ current October to March unimpaired runoff + $0.3 \times$ previous year’s index (if the previous year’s index exceeds 10.0, then 10.0 is used).

² Sacramento River unimpaired runoff is the sum of Sacramento River flow at Bend Bridge, Feather River flow to Lake Oroville, Yuba River flow at Smartville and American River flow to Folsom Lake (SWRCB 1999).

³ The San Joaquin Valley 60-20-20 Water Year Hydrologic Classification Index is equal to $0.6 \times$ current April to July unimpaired runoff + $0.2 \times$ current October to March unimpaired runoff + $0.2 \times$ previous year’s index (if the previous year’s index exceeds 4.5, then 4.5 is used).

⁴ San Joaquin River unimpaired runoff is the sum of Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake.

⁵ Using the Sacramento Valley Index, water years are defined as follows: (1) a “Wet” year occurs when the index is equal to or greater than 9.2; (2) an “Above Normal” year occurs when the index is greater than 7.8 but less than 9.2; (3) a “Below Normal” year occurs when the index is greater than 6.5 but equal to or less than 7.8; (4) a “Dry” year occurs when the index is greater than 5.4 but equal to or less than 6.5; and (5) a “Critical” year occurs when the index is equal to or less than 5.0 (SWRCB 1999).

⁶ Using the San Joaquin Valley Index, water years are defined as follows: (1) a “Wet” year occurs when the index is equal to or greater than 3.8; (2) an “Above Normal” year occurs when the index greater than 3.1 but less than 3.8; (3) a “Below Normal” year occurs when the index is greater than 2.5 but equal to or less than 3.1; (4) a “Dry” year occurs when the index is greater than 2.1 but equal to or less than 2.5; and (5) a “Critical” year occurs when the index is equal to or less than 2.1 (SWRCB 1999).

Summary

Water year 2003 conditions contrast with water years 2001 and 2002, which were designated as "Dry" by both indices. Figure 2-1 shows unimpaired runoff and water year designations for Sacramento and San Joaquin rivers for the ten-year period from 1993 to 2003. Although water conditions have improved from the previous two years, conditions remain below what was seen in the second half of the 1990s. Unimpaired runoff in water year 2003 was higher than in the previous two years due to above-normal precipitation, reservoir storage, and snowpack water content (CDEC 2003). Statewide figures for precipitation, runoff, reservoir storage, and snowpack water content in recent years are summarized in Table 2-1.

Water year 2003 had higher unimpaired runoff than in water years 2001 and 2002, with a value of 19.18 million acre-feet in the Sacramento Valley River Basin and 4.88 million acre-feet in the San Joaquin Valley River Basin. Table 2-2 summarizes streamflow conditions in these rivers during water years 2001-2003.

The Net Delta Outflow (NDO) from the estuary for water year 2000 through water year 2003 is shown in Figure 2-2. This NDO is an estimate of average daily outflow at Chipps Island and is calculated as:

$$NDO = Q_{Tot} + Q_{Precp} - Q_{Ged} - Q_{Misdv}$$

Where:

NDO = Net Delta outflow (cfs)

Q_{Tot} = Total Delta inflow (cfs)

Q_{Precp} = Total precipitation runoff (cfs)

Q_{Ged} = Total consumption in Delta (cfs)

Q_{Misdv} = Total flooded island and island storage diversions (cfs)

References

[CDEC] California Data Exchange Center. 2003. Available online at <http://cdec.water.ca.gov>. Department of Water Resources, California Cooperative Snow Surveys.

[SWRCB] State Water Resources Control Board. 1999. *Water Rights Decision 1641 for the Sacramento-San Joaquin Delta and Suisun Marsh*. Sacramento, California.

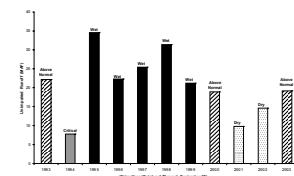


Figure 2-1a&b Unimpaired flow from the Sacramento and San Joaquin rivers from 1993 through 2003

Water year	Precipitation (% of normal)	Seasonal runoff (% of normal)	Reservoir storage (% of normal)	Snow water content (% of normal)
2000	95	45	100	75
2001	75	45	100	65
2002	80	80	100	60
2003	110	100	100	105

Table 2-1 Summary of the major hydrologic characteristics of water years 2001-2003

Year	Sacramento River			San Joaquin River		
	Total 1- Mar 31 inflow (cubic feet)	Avg 1- Mar 31 inflow (cfs)	Whole Year (cfs)	Total 1- Mar 31 runoff (cubic feet)	Avg 1- Mar 31 runoff (cfs)	Whole Year (cfs)
2000	12,01	5.90	18,88	1,38	3.78	5.90
2001	5,64	2.46	8,81	0.82	2.23	3.18
2002	8,32	4.67	14,6	1.27	2.74	4.06
2003	10,71	7.00	19,18	1.30	3.69	4.88

Table 2-2 Average streamflow for the Sacramento and San Joaquin rivers during water years 2001-2003.

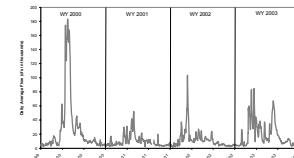


Figure 2-2 Net Delta Outflow and average daily flow from water year 2000 through water year 2003

Figure 2-1a Unimpaired flow from the Sacramento River from 1993 through 2003, with water year designation. Values given in million acre-feet (maf)

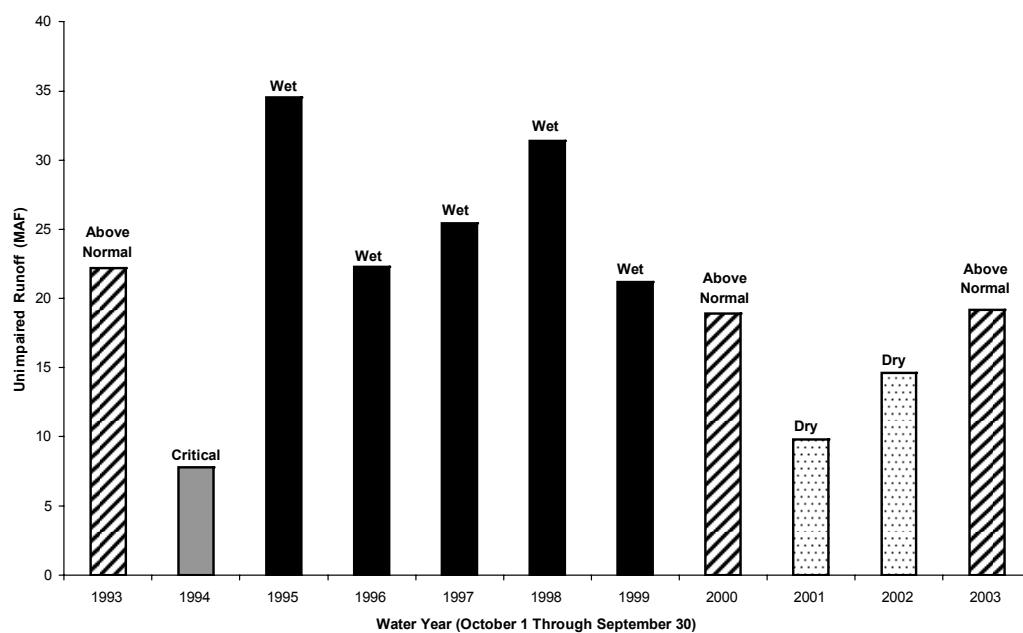


Figure 2-1b Unimpaired flow from the San Joaquin River from 1993 through 2003, with water year designation. Values given in million acre-feet (maf)

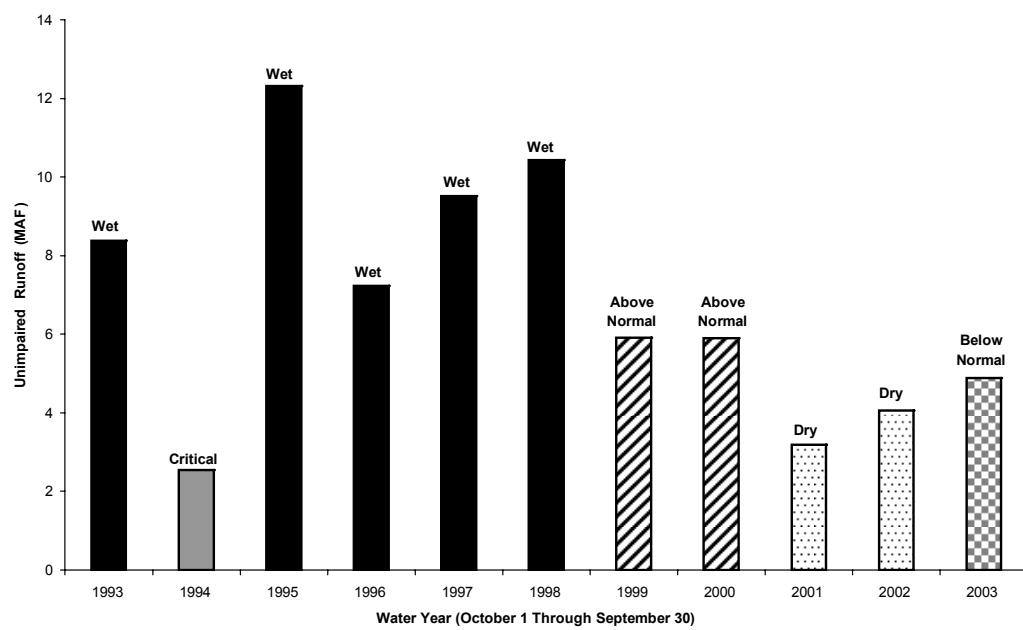


Figure 2-2 Net Delta Outflow and average daily flow from water year 2000 through water year 2003.

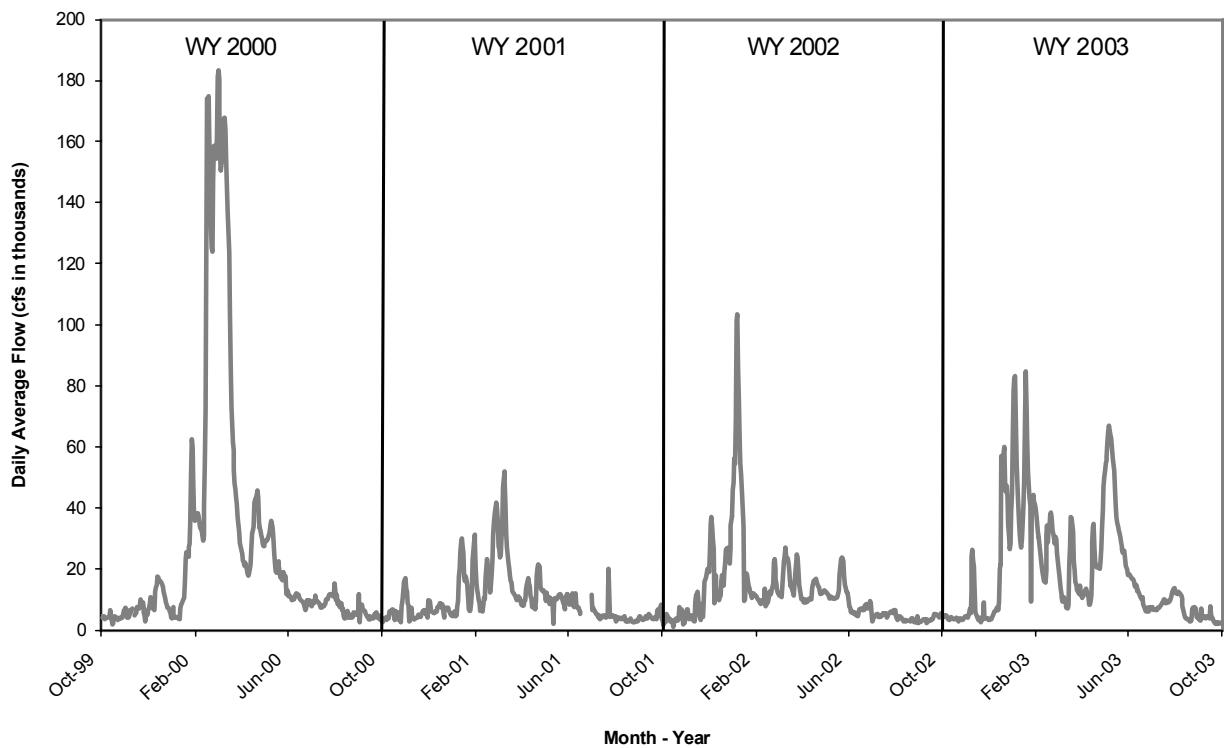


Table 2-1 Summary of the major hydrologic characteristics of water years 2000-2003.

Water year	Precipitation (% of normal)	Seasonal runoff (% of normal)	Reservoir storage (% of normal)	Snow water content (% of normal)
2000	95	100	115	75
2001	75	45	100	65
2002	80	80	100	60
2003	110	100	105	105

Table 2-2 Average streamflow for the Sacramento and San Joaquin rivers during water years 2000-2003. All values in million acre-feet (maf).

Year	Sacramento River			San Joaquin River		
	Oct 1- Mar 30 (maf)	Apr 1- Jul 30 (maf)	Whole Year (maf)	Oct 1- Mar 30 (maf)	Apr 1- Jul 30 (maf)	Whole Year (maf)
2000	12.01	5.99	18.88	1.98	3.78	5.90
2001	5.64	3.46	9.81	0.92	2.23	3.18
2002	9.32	4.57	14.6	1.27	2.74	4.06
2003	10.71	7.66	19.18	1.26	3.49	4.88